(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 451 705 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication of patent specification: **03.08.94 Bulletin 94/31**

(51) Int. Cl.^{5}: **A61F 13/15**

(21) Application number: **91105341.1**

(22) Date of filing: **04.04.91**

(54) Apparatus for and method of applying an elastic material to a flexible backing.

(30) Priority: **06.04.90 US 505954**

(43) Date of publication of application: **16.10.91 Bulletin 91/42**

(45) Publication of the grant of the patent: **03.08.94 Bulletin 94/31**

(84) Designated Contracting States: **BE CH DE FR GB IT LI LU NL**

(56) References cited:
EP-A- 0 066 545
EP-A- 0 081 123
EP-A- 0 154 068
DE-C- 3 347 294
US-A- 4 397 704
US-A- 4 488 923

(73) Proprietor: **KIMBERLY-CLARK CORPORATION**
401 North Lake Street
Neenah Wisconsin 54957-0349 (US)

(72) Inventor: **Hoffman, John William**
3111 West Sunset Court
Appleton, Wisconsin (US)
Inventor: **Dehn, Karl Robert**
2705 Eagle Avenue
Wausau, Wisconsin (US)

(74) Representative: **Patentanwälte Grünecker, Kinkeldey, Stockmair & Partner**
Maximilianstrasse 58
D-80538 München (DE)

EP 0 451 705 B1

Description

This invention relates to an apparatus for and method of applying an elastic strip to a flexible backing. It relates in particular to an apparatus for and method of applying elastic strips to flexible plastic backings, such as polyethylene films, to be used in catamenial devices.

In diapers, catamenial devices, and other absorbent devices, it is commonplace to have an absorbent material, for example, a batt made from cellulosic fluff, that is backed with a thin plastic film. The backing is supposed to retain moisture in the device. For comfort and additional moisture retention assurance, such devices have been designed to conform to the body. To make such a device conform to the body, an elastic member is often bonded to the plastic backing so as to create pleats or folds in the backing. The elastic is typically bonded to the flat backing while the elastic is stretched. After the elastic is secured, the elastic is released which causes the elastic to contract and gather the flat backing and the absorbent material into a curved shape that conforms to the body.

Examples of a device and method of applying elastic to a flexible backing are illustrated in EP-A-0 154 068 describing a method and an apparatus as defined in the preambles of claims 1 and 17, and in US-A-4,397,704 issued to Frick on August 9, 1983. These publications teach that a flexible backing is corrugated by winding the backing onto a drum with corrugations formed in its circumference. While the drum was rotating, unstretched, adhesive-coated elastic strips were applied intermittently onto and perpendicular to the corrugations on the corrugated backing such that the elastic strips adhered only to the peaks, but not the valleys, of the corrugations. After the strips were adhered to the peaks, the flexible backing was unwound from the drum and stretched such that the corrugations were removed and the portions of the strips previously spanning the valleys contacted the backing. The elastic was then adhered along its length to the stretched backing by passing the backing and elastic through nip rolls. When the assembly was allowed to relax after stretching, the elastic gathered the backing.

A problem with this approach is that each piece of bonded elastic has regions of stretched and unstretched elastic between the ends of the elastic. Therefore, when the elastic strip is stretched to the extent that the flexible backing will permit, the unstretched regions correspond to those areas of the elastic that were originally adhered to the peaks of the corrugations in the unstretched state. The stretched regions correspond to those areas that spanned the valleys of the corrugations. The unstretched regions reduce the effectiveness of the elastic because they do not contribute to the gathering of the backing.

Such a situation can be tolerated in a large absorbent device such as a diaper. The elastic in a diaper is long enough that it can produce the desired curvature with much of the elastic effectively not utilized because it cannot be stretched.

The situation, however, cannot be tolerated in small absorbent devices such as catamenial devices where localized areas of the device have elastic bonded to it. A much larger percentage of stretchable elastic is needed per length of elastic in a small device to produce the body conformity desired.

With this invention, localized gathering of flexible backing is possible because all the elastic between the anchored ends of the elastic in this invention contributes to stretching. The method of this invention involves feeding the flexible backing material onto a drum that has surface grooves parallel to the axis of the drum such that at least a portion of the flexible backing overlays the drum and the internal surface of at least one of the grooves. The grooves are spaced between about 5 and 25 centimeters (cm) apart on the drum, and each of the grooves has a substantially smooth internal surface with a surface length between about 3 and 24 cm. Each of the grooves is between approximately 2.5 and 7.5 cm wide. Furthermore, the ratio between the surface length and groove width is between about 1.3:1 and 3:1.

The adhesive is applied to the backing such that more adhesive is applied per unit area of backing to adhere the ends of the elastic than its intermediate portion.

At least one elastic strip is placed across the width of the one groove. The elastic strip is anchored at its ends to the flexible backing on the edge of the groove outside the groove so the strip spans the groove. The flexible backing is drawn off the drum and pulled so that the elastic is stretched to overlay the backing. The portion of the elastic located intermediate the anchored ends is adhered to the backing when the intermediate portion is stretched. When the elastic is allowed to relax, it gathers the flexible backing into localized pleats.

The flexible backing is used in small absorbent devices, and the elastic allows the device to conform to the human body.

The general object of this invention is to provide an apparatus for a method for applying an elastic material to a flexible backing. A more specific object of this invention is to provide an apparatus which permits elastic strips to be aligned with and fastened to a backing member.

Another object of this invention is to provide an apparatus which utilizes a drum having a plurality of surface grooves formed therein and into which a backing material can droop.

Still another object of this invention is to provide a simple and economical means of applying elastic strips to a flexible backing material.

Other objects and advantages of the present invention will become more apparent to those skilled in the art in view of the following description and the accompanying drawings showing an embodiment of the present invention.

Figure 1 is a side view of an apparatus for applying an elastic material to a flexible backing;

Figures 2-5 are schematic representations of steps in the process of this invention;

Figure 6 is a schematic representation of an apparatus for assembling a catamenial device using the flexible backing produced by the apparatus in Figure 1; and

Figure 7 is a perspective view of a catamenial device produced in accordance with the apparatus and process of this invention.

Referring to Fig. 1, an apparatus 10 for practicing the process of this invention is illustrated. The apparatus 10 includes a feed device 12 for feeding backing and elastic onto a looper drum 14. The looper drum 14 and appurtenant devices apply elastic strips to the backing in a manner described below. The backing is then removed in a continuous sheet from the looper drum 14 by a conveyor 16. The backing is then used for backing catamenial devices as shown in Fig. 7. Feed device 12 includes a first dispensing roll for dispensing a flexible backing sheet material 20. The backing sheet 20 is preferably a thin sheet of polyethylene, for example, about 0.5 to 3 millimeters (mm) thick and about 5 to 20 cm. wide. The backing sheet 20 is passed above apparatus 10 on a series of guide rolls 26b and 26c, and fed between a pair of motor-driven nip rolls 28a and 28b. The nip rolls 28a and 28b draw the backing sheet 20 from the feed roll and over the guide rolls 26b and 26c, and feed the backing sheet 20 onto the looper drum 14.

The feed device 12 also includes a second dispensing roll 18 for dispensing an elastic strip material 24. The elastic strip 24 is preferably made from stretch bonded laminate (SBL), and comes in a continuous strip that is about 4 centimeters (cm) wide. The elastic material 24 is drawn across a guide roll 30 by a pair of motor-driven nip rolls 32a and 32b. As the elastic strip 24 is drawn across the guide roll 30, it is cut lengthwise by a score slitter 22 which is mounted adjacent to the roll 30 into two approximately 2 cm wide continuous parallel strips. The two strips are then fed by nip rolls 32a and 32b between a vacuum transfer drum 34 and an elastic cutter 36 described in more detail below. The elastic cutter 36 cuts the two parallel elastic strips simultaneously, and the vacuum transfer drum 34a transfers the two strips onto the looper drum 14.

The looper drum 14 is a cylindrical drum that is rotated around its longitudinal axis by a motor (not shown). The looper drum 14 has a plurality of grooves 38 that are formed parallel to the longitudinal axis of drum and spaced equidistant from each other around the circumference of the drum about 5 to 25 cm apart. The looper drum 14 has vacuum suction means that operate to draw suction through the surface of the drum 14 at locations and times described below.

The looper drum 14 is rotated clockwise when viewed from the side shown in Fig. 1. The backing sheet 20 is fed onto the surface of the looper drum 14 by the nip rolls 28a and 28b that are positioned at approximately the 11 o'clock position relative to the drum 14. A vacuum is applied to that portion of the drum 14 starting between the 11 and 12 o'clock positions, and the vacuum is ended at about the six o'clock position. No vacuum is applied to the surface of the drum 14 between the six o'clock position and the vacuum start position.

The operation of the looper drum 14 can be understood by following one groove 38a as it rotates from the 12 o'clock position clockwise. As the backing sheet 20 is fed onto the surface of the looper drum 14, the vacuum draws a portion of the backing sheet 20 into a groove 38a at the 12 o'clock position as shown in Fig. 2.

Preferably the vacuum is drawn at a pressure of between about 1333 and 6666 mbar (1000 and 5000 torr). The nip rolls 28 feed the backing sheet 20 at a rate that allows the necessary backing sheet 20 to be drawn into the groove 38a without noticeable stretching of the backing sheet 20. The feed rate of the nip rolls 28a and 28b is not so fast that the backing sheet material 20 between adjacent grooves 38 cannot lay smooth on the surface of the looper drum 14.

As the groove 38a passes the 12 o'clock position, a pressure-sensitive adhesive is sprayed from a stationary adhesive gun 40 in two spaced parallel strips, for example, in strips where the elastic will be secured as described below, that are between about 0.5 and 18 cm apart, preferably 6 cm apart. The adhesive is preferably a sprayable, pressure-sensitive type, for example, adhesive 70-3166 from National Starch Corporation. The adhesive has a shear force of between 1000 and 4000 grams as measured by an Instron machine. Each strip of adhesive is applied into the groove 38a and on anchor areas 42a and 42b on either side and outside of the groove 38a on the surface of the looper drum 14. The adhesive is not otherwise applied to the backing sheet 20 on the surface of the looper drum 14. The stationary adhesive gun 40 allows more adhesive to be applied per unit area on the anchor areas 42a and 42b than on the backing sheet 20 lining the groove 38a. The reason for this is that the looper drum 14 is rotated at a constant speed under the adhesive gun 40 while the adhesive is sprayed on at a constant rate. Since there is more area in the groove 38a to cover with adhesive per unit time than on the anchor areas 42a and 42b, the backing sheet 20 receives less adhesive. The advantages of this difference in adhesive application will be explained below.

As the groove 38a passes the 2 o'clock position, the vacuum transfer drum 34 simultaneously transfers onto the looper drum 14 two strips of elastic 44. The elastic strips 44 are cut from the continuous elastic strip 24 such that the two strips 44 are parallel to one another and span the groove 38a, as is shown in Fig. 3. Only one of the elastic strips 44 is shown in Fig. 3. Each of the elastic strips 44 is positioned such that its ends overlay the adhesive-coated anchor areas 42a and 42b. Each elastic strip 44 is positioned such that between about 0.3 and 2.5 cm of each end overlays the anchor areas 42a and 42b. As shown in Fig. 1, the vacuum transfer drum 34 is close to the looper drum 14. The gap between the surfaces of the two drums 34 and 14 is about 0.5 to 3.0 times the thickness of the elastic. The elastic strips 44 are applied such that they pass through this gap, which compresses the ends of elastic strips 44 against the anchor areas 42a and 42b. This ratio of gap thickness to elastic thickness has been found to provide an initial attachment of elastic to the backing sheet 20 without compressing the backing sheet 20 and the elastic unduly to cause adhesive to ooze from between them.

The elastic is preferably a stretch bonded laminate type, for example, from Kimberly-Clark Corp., and has a modulus of elasticity between about 80N/m^2 to about 120N/m^2. When the elastic is stretched 100%, it has a tension ranging between about 350 and 450 grams per inch width of the elastic.

Nip rolls 46 and 48 are positioned at about the four o'clock and about the six o'clock positions. The nip roll 46 further compresses the elastic strips 44 onto the anchor areas 42a and 42b. The nip roll 48 isolates the nip roll 46 from the tension exerted on the backing sheet 20 by the conveyor 16. After the six o'clock position, the vacuum exerted on the groove 38a is released, and the backing sheet 20 is removed from the looper drum 14 in a manner described below.

The grooves 38 on the looper drum 14 should have a substantially smooth internal surface. The "internal surface" is the area between points A and B along the surface of the groove shown in Fig. 2. By "substantially smooth" is meant that there are no sharp contours that prevent the backing sheet 20 from conforming to the contours of the internal surface of the groove 38. As shown in Fig. 2, for example, the groove 38a has two flat sidewalls 50a and 50b that slope toward one another as they go deeper into the groove 38. The sidewalls 50a and 50b slope at an angle alpha, (see Fig. 3) between about 5 and 20 degrees as measured from a radius R drawn through the middle of the groove 38. The bottom ends of the sidewalls 50a and 50b are joined by a curved portion 52. Therefore, as the backing sheet 20 is drawn into the groove 38a under vacuum, the backing sheet 20 will slide into and conform to the groove 38. If the groove 38 were not substantially smooth, then too little backing sheet material 20 may be drawn into the grooves 38, or different amounts of material will be drawn into the several grooves 38. If too little backing sheet material 20 is drawn into the grooves 38, that affects the degree of gathering of the backing sheet material 20. If different amounts of backing sheet material 20 are drawn into the several grooves 38, that may adversely affects the positioning of the elastic as well.

The grooves 38 also have a surface length from about 3 to 24 cm long, preferably from about 5 to 15 cm long. By "surface length" is meant the length of the surface of the groove 38a between points A and B in Fig. 2. The grooves 38 also have a width W between points A and B of between about 2.5 and 7.5 cm., preferably between about 4 and 7 cm. Most importantly, the ratio between the surface length and groove width is between about 1.3:1 and 3:1, preferably between about 1.75:1 and 2:1.

The elastic strips 44 are produced from the elastic material 24. As indicated above, the elastic material 24 is slit with a stationary knife 22 longitudinally into two parallel strips, each of which is about 2 cm. wide. The two parallel strips are spread about 5 cm apart, and fed between the nip rolls 32a and 32b. The nip rolls 32a and 32b are rotated stepwise at the same speed. Their speed is controlled by an optical sensor that senses the rotational speed and position of the looper drum 14. The speed of the nip rolls 32a and 32b are controlled such that only about 6 cm lengths of elastic are fed to the vacuum transfer drum 34 and to the cutter 36 for every groove 38 that passes the vacuum transfer drum 34.

The vacuum transfer drum 34 has a pair of cutting mandrels 35 that are spaced 180 degrees apart on the cylindrical surface. The mandrels 35 contact the cutter blades 37 that protrude from the surface of cutter drum 36. The cutter drum 36 is driven synchronously with the vacuum transfer drum 34 so that as the approximately 6 cm lengths of elastic are fed between the vacuum transfer drum 34 and the cutter drum 36 by the nips 32a and 32b, a cutter blade 37 will contact the mandrel 35 to sever the two long strips of elastic 44 (see Figs. 1 and 3). The vacuum transfer drum 34 includes a vacuum device that holds the elastic strips 44 onto the surface of vacuum transfer drum 34 until the drum 34 rotates so that the elastic strips 44 are between the vacuum transfer drum 34 and the looper drum 14. The vacuum is then released from the elastic strips 44, and the elastic strips 44 are compressed against and adhered to the anchor areas on the backing sheet 20 as described previously. The vacuum transfer drum 34 is driven synchronously with the looper drum 14 so that they rotate at the same angular speed. The "same angular speed" means that their surfaces travel at the same velocity.

The tension on the backing sheet 20, as it is re-

moved from the looper drum 14, is from having to operate the conveyor 16 to remove the backing sheet 20 from the looper drum 14 at a speed 5% greater than the speed of the backing sheet 20 being fed onto the looper drum 14. It was found necessary to do this to stretch the elastic strips 44 between the anchor areas 42a and 42b so that the elastic overlays the backing sheet material 20 that was gathered into the groove 38a, (see Fig. 5). The stretching of the elastic begins as the backing sheet 20 is removed from the looper drum 14 (see Fig. 4) and has to be completed before the backing sheet 20 is drawn through a pair of nip rolls 54 and 56 (see Fig. 5) in the conveyor 16. The nip rolls 54 and 56 compress the stretched elastic against the backing sheet 20 such that the adhesive applied between the anchor areas 42a and 42b, for example, the adhesive applied to the backing sheet 20 that was once in the groove 38a, can adhere the elastic to the backing sheet 20 between the anchor areas.

After the backing sheet 20 is passed through the nip rolls 54 and 56 and through the conveyor 16, the adhesive is applied with an adhesive gun 58 (see Fig. 6) across the entire surface of the backing sheet 20 on which the elastic strips 44 are adhered.

Referring to Fig. 6, absorbent pads 60 are spaced along a conveyor (not shown) and fed by the conveyor onto a continuous sheet of cover material 62 which is moving at the same speed as the conveyor. The backing material 20, which is still under tension to keep the elastic strips 44 stretched, is fed at the same speed as the cover material 62 through a pair of nip rolls 64 and 66. The adhesive previously sprayed onto the backing sheet 20 adheres the absorbent pads 60 onto the backing sheet 20 and adheres the cover material 62 to the backing sheet 20 around the perimeters of the absorbent pads 60. It should be noted that the absorbent pads 60 are narrower than the width of the backing sheet 20 and the cover sheet 62.

Referring to Fig. 7, a finished catamenial pad 68 is shown which has been die cut from the web of material passed through the nip rolls 64 and 66. Each finished pad 68 has two parallel elastic strips 44 that gather the otherwise planar product into a curved absorbent pad 68. The elastic strips 44 form part of the perimeter of the catamenial pads 68, and are centered along the middle edges of the pad with the absorbent pad 60 positioned therebetween. As can also be seen, the backing sheet 20 is adhered about its perimeter to the cover sheet 62. Preferably, the cover sheet 62 is made from a spunbonded material that allows moisture to flow easily through, so that it can be absorbed by the absorbent pad 60. The catamenial pad 68 is constructed otherwise as taught in U.S. patent 4,770,657 issued to Ellis et al. on September 13, 1988.

While the invention has been described in conjunction with a specific embodiment, it is to be understood that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, this invention is intended to embrace all such alternatives, modifications and variations which fall within the scope of the appended claims.

Claims

1. A method for applying an elastic material (24)to a flexible backing (20), comprising:
feeding the flexible backing material (20) onto a drum (14) that has surface grooves (38) parallel to the axis of the drum (14) such that at least a portion of said flexible backing (20) overlays the drum (14) and the internal surface (50a,50b,52) of at least one of the grooves (38);
placing at least one unstretched strip (44) of said elastic material (24) onto said drum (14) whereby said elastic material (24) spans said grooves (38);
anchoring said elastic material (24) to said flexible backing (20) at anchor areas (42a,42b) between said grooves (38) by adhesive means;
drawing said flexible backing (20) off said drum (14);
extending said flexible backing (20) so that the elastic material (24) is stretched to overlay the backing (20); and
adhering the portion of the elastic material (24) intermediate said anchor areas (42a,42b) to said backing (20) while said intermediate portion is extended;
characterised in that
placing said elastic strip (44) across the width of only one groove (38) wherein said grooves (38) are spaced between about 5 and 25 cm apart on said drum (14), and each of said grooves (38) has a substantially smooth internal surface (50a,50b,52) with a surface length between about 3 and 24 cm, and wherein each of said grooves (38) is between approximately 2.5 and 7.5 cm wide, and the ratio between the surface length and groove width is between about 1.3:1 and 3:1;
anchoring said strip (44) at its ends to said anchor areas (42a,42b) on the edge of said one groove (38) such that said strip (44) spans across only one groove (38); and
applying said adhesive to said backing (20) such that more adhesive is applied per unit area of backing (20) to adhere the ends of said elastic strip (44) than to adhere said intermediate portion of said elastic strip (44).

2. The method of claim 1 wherein said elastic strip (44) is anchored at its ends with a pressure sen-

sitive adhesive.

3. The method of claim 1 or 2 wherein said elastic strip (44) is adhered at its ends by spraying said flexible backing (20) with said adhesive, placing said elastic strip (44) on said backing (20) and applying pressure to said elastic strip (44).

4. The method of any one of claims 1 to 3 wherein said adhesive is applied by spraying said adhesive on said flexible backing (20) while rotating said drum (14).

5. The method of any one of claims 1 to 4 wherein said elastic material (24) has a modulus of elasticity from about 80N/m² to about 120N/m².

6. The method of any one of claims 1 to 5 wherein said adhesive has a shear force between about 1000 and 4000 grams.

7. The method of any one of claims 1 to 6 wherein each of said grooves (38) has a pair of flat sides (50a,50b) that slope upwardly and outwardly from the bottom of the groove (38) and an arcuate portion (52) that joins said flat sides (50a,50b) at the bottom of said groove (38).

8. The method of claim 7 wherein each of said flat sides (50a,50b) slopes at an angle between 5 and 20 degrees into said groove (38).

9. The method of any one of claims 1 to 8 wherein said drum (14) includes vacuum means, and said method further comprises drawing a vacuum on said drum (14) whereby said flexible backing (20) is retained on said drum (14) and drawn into said one groove (38).

10. The method of claim 9 wherein said vacuum is drawn between about 1333 and 6666 mbar (1000 and 5000 torr).

11. The method of any one of claims 1 to 10 wherein said elastic material (24) is fed from a dispensing roll (18) to a cutter means (37) where it is cut into discrete strips (44).

12. The method of claim 11 wherein said drum (14) and a transfer drum (34) are rotated at the same angular speed at a gap between their surfaces from about .25 to about 3 times the thickness of said elastic material (24), and wherein said strip (44) is placed onto said drum (14) by passing said strip (44) through said gap.

13. The method of claim 12 wherein said strip (44) is anchored at its ends by applying a pressure-sensitive adhesive onto said backing (20) before said strip (44) is placed on said drum (14).

14. The method of claim 12 or 13 further comprising compressing the ends of said strip (44) against said drum (14) after said strip (44) is passed through said gap.

15. The method of any one of claims 1 to 14 wherein said ends are compressed by passing said strip (44) and backing (20) between a nip roll (46) and said drum (14).

16. The method of claim 15 wherein said strip (24) and backing (20) is passed between a second nip roll (48) and said drum (14) before said backing (20) is drawn off said drum (14).

17. An apparatus (10) for applying an elastic material (24) to a flexible backing (20), comprising:
means (26a,26b;28a,28b) for feeding the flexible backing material (20) onto a first drum (14) such that a least a portion of said flexible backing (20) overlays the drum (14);
said first drum (14) having surface grooves (38) parallel to the axis of said first drum (14);
means (34) for placing at least one unstretched strip (44) of said elastic material (24) onto said drum (14) whereby said elastic material (24) spans said grooves (38);
means (40,34) for anchoring said elastic material (24) to said flexible backing (20) at anchor areas (42a,42b) between said grooves (38) by adhesive means;
means (16) for drawing said flexible backing (20) off said drum (14);
means (16) for extending said flexible backing (20) so that the elastic material (24) is stretched to overlay the backing (20); and
means (54,56) for adhering the portion of the elastic intermediate said anchor areas (42a,42b) to said backing (20) while said intermediate portion is extended,
characterised by
an adhesive gun (40) for applying said adhesive to said backing (20) such that more adhesive is to be applied per unit area on said anchor areas (42a,42b) than on the backing (20) lining said grooves (38), and means (34) for placing said elastic strip (44) across the width of only one groove (38) and anchoring said strip (44) at its ends to said anchor areas (42a,42b) on the edge of said one groove (38) such that said strip (44) spans across only one groove (38), wherein said grooves (38) are spaced between about 5 and 25 cm apart on said drum (14), and each of said grooves(38) has a substantially smooth internal surface with a surface length between about 3

and 24 cm, and wherein each of said grooves (38) is between approximately 2.5 and 7.5 cm wide, and the ratio between the surface length and groove width is between about 1.3:1 and 3:1.

18. The apparatus of claim 17 wherein said means for anchoring and adhering comprises an adhesive spray gun (40) and means (46,48) for applying pressure to said elastic strip (44).

19. The apparatus of claim 18 wherein said adhesive spray gun (40) is stationary whereby adhesive is applied by spraying adhesive on the flexible backing (20) while said first drum (14) is rotated.

20. The apparatus of any one of claims 17 to 19 wherein each of said grooves (38) has a pair of flat sides (50a,50b) that slope upwardly and outwardly from the bottom of the groove, and an arcuate portion (52) that joins said flat sides (50a,50b) at the bottom of said groove (38).

21. The apparatus of claim 20 wherein each of said flat sides (50a,50b) slopes at an angle between 5 and 20 degrees into said groove(38).

22. The apparatus of any one of claims 17 to 21 wherein said first drum (14) includes vacuum means, whereby said flexible backing (20) is retained on said drum (14) and drawn into said one groove (38) by said vacuum means.

23. The apparatus of any one of claims 17 to 22 that further includes cutter means (37) for cutting said elastic material (24) into discrete elastic strips (44).

24. The apparatus of any one of claims 17 to 23 further including drive means for rotating said drum (14) and a transfer drum (34) at the same angular speed and wherein there is a gap between their surfaces from about .25 to about 3 times the thickness of said elastic material (24), and wherein said strip (44) is placed onto said drum (14) by passing said strip (44) through said gap.

25. The apparatus of claim 24 further comprising means (46,48) for compressing the ends of said strip (44) against said drum (14) after said strip (44) is passed through said gap.

26. The apparatus of claim 25 wherein said compressing means includes a first nip roll (46).

27. The apparatus of claim 26 wherein said compressing means includes a second nip roll (48).

28. The apparatus of any one of claims 1 to 27 wherein said ratio is between 1.75:1 and 2:1.

Patentansprüche

1. Verfahren zum Aufbringen eines elastischen Materials (24) auf eine flexible Rückseite (20), wobei:
das flexible Rückseitenmaterial (20) auf eine Trommel (14) gefördert wird, die Oberflächennuten (38) parallel zur Achse der Trommel (14) aufweist, so daß mindestens ein Teil der flexiblen Rückseite (20) die Trommel (14) und die innere Oberfläche (50a,50b,52) von mindestens einer der Nuten (38) überlagert;
mindestens ein ungespannter Streifen (44) des elastischen Materials (24) auf die Trommel (14) gelegt wird, wobei das elastische Material (24) die Nut (38) überspannt;
das elastische Material an der flexiblen Rückseite (20) an Ankerflächen (42a,42b) zwischen den Nuten (38) durch Klebmittel verankert wird;
die flexible Rückseite (20) von der Trommel (14) abgezogen wird;
die flexible Rückseite (20) ausgedehnt wird, so daß das elastische Material (24) gespannt wird, um die Rückseite (20) zu überlagern; und
der Bereich des elastischen Materials (24) zwischen den Verankerungsflächen (42a,42b) an der Rückseite (20) angeklebt wird, während der Zwischenbereich ausgedehnt ist,
dadurch gekennzeichnet,
daß der elastische Streifen (44) über die Breite von nur einer Nut (38) plaziert wird, wobei die Nuten (38) auf der Trommel (14) voneinander zwischen etwa 5 und 25 cm entfernt sind, und wobei jede der Nuten (38) eine im wesentlichen glatte, innere Oberfläche (50a,50b,52) mit einer Oberflächenlänge zwischen etwa 3 und 24 cm aufweist, und wobei jede der Nuten (38) zwischen etwa 2,5 und 7,5 cm breit ist, und das Verhältnis zwischen der Oberflächenlänge und der Nutbreite zwischen etwa 1,3:1 und 3:1 liegt,
daß der Streifen (44) mit seinen Enden an den Verankerungsflächen (42a,42b) an der Kante dieser einen Nut (38) derart verankert wird, daß der Streifen (44) sich nur über eine Nut (38) spannt; und
der Klebmittel auf die Rückseite (20) derart aufgebracht wird, daß mehr Klebmittel pro Flächeneinheit der Rückseite zum Ankleben der Enden des elastischen Streifens (44) aufgebracht wird als zum Ankleben des Zwischenbereichs des eleastischen Streifens (44).

2. Verfahren nach Anspruch 1, wobei der elstische Streifen (44) mit seinen Enden durch einen drucksensitiven Kleber verankert wird.

3. Verfahren nach Anspruch 1 oder 2, wobei der elastische Streifen (44) mit seinen Enden verklebt wird, in dem die flexible Rückseite (20) mit dem Kleber besprüht wird, der elastische Streifen (44) auf der Rückseite (20) plaziert wird und ein Druck auf den elastischen Streifen (44) ausgeübt wird.

4. Verfahren nach einem der Ansprüche 1 bis 3, wobei der Kleber durch Aufsprühen des Klebers auf der flexiblen Rückseite (20) aufgebracht wird, während die Trommel (14) rotiert.

5. Verfahren nach einem der Ansprüche 1 bis 4, wobei das elastische Material (44) einen Elastizitätsmodul von etwa 80N/m² bis etwa 120N/m² aufweist.

6. Verfahren nach einem der Ansprüche 1 bis 5, wobei der Kleber eine Scherkraft zwischen etwa 1000 und 4000 Gramm aufweist.

7. Verfahren nach einem der Ansprüche 1 bis 6, wobei jede der Nuten (38) ein Paar flacher Seiten (50a,50b), die vom Boden der Nut (38) nach oben und außen schräg ansteigen, und einen gekrümmten Bereich (52) aufweisen, der die flachen Seiten (50a,50b) am Boden der Nut (38) verbindet.

8. Verfahren nach Anspruch 7, wobei jede der flachen Seiten unter einem Winkel zwischen 5° und 20° in die Nut 38 abfällt.

9. Verfahren nach einem der Ansprüche 1 bis 8, wobei die Trommel (14) eine Vakuumeinrichtung aufweist, und das Verfahren weiterhin das Erzeugen eines Vakuums an der Trommel (14) umfaßt, wodurch die flexible Rückseite (20) an der Trommel (14) zurückgehalten und in die eine Nut (38) eingezogen wird.

10. Verfahren nach Anspruch 9, wobei ein Vakuum zwischen 1333 und 6666 mbar (1000 und 5000 Torr) erzeugt wird.

11. Verfahren nach einem der Ansprüche 1 bis 10, wobei das elastische Material (24) von einer Spenderrolle (18) zu einer Schneideinrichtung (37) gefördert wird, wo es in einzelne Streifen (44) geschnitten wird.

12. Verfahren nach Anspruch 11, wobei die Trommel (14) und eine Übertragungstrommel (34) mit der gleichen Winkelgeschwindigkeit an einem Klemmspalt zwischen ihren Oberflächen gedreht werden, der zwischen etwa 0,25 bis etwa 3mal der Dicke des elastischen Materials (24) entspricht, und wobei der Streifen (44) auf der Trommel (14) durch Hindurchführen des Streifens (44) durch den Klemmspalt plaziert wird.

13. Verfahren nach Anspruch 12, wobei der Streifen (44) mit seinen Enden durch Aufbringen eines drucksensitiven Klebers auf der Rückseite (20) verankert wird, bevor der Streifen (44) auf der Trommel (14) plaziert wird.

14. Verfahren nach Anspruch 12 oder 13, ferner umfassend das Pressen der Enden des Streifens (44) gegen die Trommel (14), nachdem der Streifen (44) durch den Klemmspalt geführt ist.

15. Verfahren nach einem der Ansprüche 1 bis 14, wobei die Enden beim Hindurchführen des Streifens (44) und der Rückseite (20) zwischen einer Klemmspaltrolle (46) und der Trommel (14) zusammengedrückt werden.

16. Verfahren nach Anspruch 15, wobei der Streifen (24) und die Rückseite (20) durch eine zweite Klemmspaltrolle (48) und die Trommel (14) hindurchgeführt werden, bevor die Rückseite (20) von der Trommel (14) abgezogen wird.

17. Vorrichtung (10) zum Aufbringen eines elastischen Materials (24) auf eine flexible Rückseite (20), mit
einer Einrichtung (26a,26b;28a,28b) zum Fördern des flexiblen Rückseitenmaterials (20) auf eine erste Trommel (14) derart, daß mindestens ein Bereich der flexiblen Rückseite (20) die Trommel (14) überlagert;
wobei die erste Trommel (14) Oberflächennuten (38) parallel zur Achse der ersten Trommel (14) aufweist;
einer Einrichtung (34) zum Plazieren mindestens eines ungespannten Streifens (44) des elastischen Materials (24) auf der Trommel (14), wobei das elastische Material (24) die Nuten (38) überspannt;
einer Einrichtung (40,34) zum Verankern des elastischen Materials (24) durch Klebmittel auf der flexiblen Rückseite (20) in Verankerungsbereichen (42a,42b) zwischen den Nuten(38);
einer Einrichtung (60) zum Abziehen der flexiblen Rückseite (20) von der Trommel (14);
einer Einrichtung (16) zum Ausdehnen der flexiblen Rückseite (20), so daß das elastische Material (24) gespannt wird, um die Rückseite (20) zu überlagern; und
einer Einrichtung (54,56) zum Ankleben des Bereichs des elastischen Materials zwischen den Verankerungsflächen (42a,42b) an der Rückseite (20), während der Zwischenbereich ausgedehnt ist,
gekennzeichnet durch

eine Klebstoffpistole (40) zum Aufbringen von Klebstoff auf die Rückseite (20) derart, daß mehr Klebstoff pro Flächeneinheit auf die Verankerungsflächen (42a,42b) als auf die die Nuten (38) auskleidende Rückseite (20) aufgebracht wird, und daß eine Einrichtung (34) vorgesehen ist, um den elastischen Streifen (44) über die Breite von nur einer Nut (38) zu plazieren und den Streifen (44) mit seinen Enden auf den Verankerungsflächen (42a,42b) an der Kante der einen Nut (38) derart zu verankern, daß der Streifen (44) sich nur über eine Nut (38) spannt, wobei die Nuten (38) auf der Trommel (40) zwischen etwa 5 und 25 cm zueinander beabstandet sind, und wobei jede der Nuten (38) eine im wesentlichen glatte, innere Oberfläche mit einer Oberflächenlänge zwischen etwa 3 und 24 cm aufweist, und wobei jede der Nuten (38) zwischen etwa 2,5 und 7,5 cm breit ist, und wobei das Verhältnis zwischen der Oberflächenlänge und der Nutbreite zwischen 1,3:1 und 3:1 beträgt.

18. Vorrichtung nach Anspruch 17, wobei die Einrichtung zum Verankern und Ankleben eine Klebstoffspritze (40) und eine Einrichtung (46,48) zum Aufbringen von Druck auf den elastischen Streifen (44) aufweist.

19. Vorrichtung nach Anspruch 18, wobei die Klebstoffspritze (40) stationär ist, wodurch Klebstoff durch Aufsprühen des Klebstoffs auf die flexible Rückseite (20) aufgebracht wird, während sich die erste Trommel (14) dreht.

20. Vorrichtung nach einem der Ansprüche 17 bis 19, wobei jede der Nuten (38) ein Paar flacher Seiten (50a,50b), die vom Boden der Nut schräg nach oben und außen verlaufen, und einen gekrümmten Bereich (52) aufweist, der die flachen Seiten (50a,50b) am Boden der Nut (38) verbindet.

21. Vorrichtung nach Anspruch 20, wobei jede der flachen Seiten (50a,50b) unter einem Winkel zwischen 5° und 20° schräg in die Nut (38) verläuft.

22. Vorrichtung nach einem der Ansprüche 17 bis 21, wobei die erste Trommel (14) eine Vakuumeinrichtung aufweist, wodurch die flexible Rückseite (20) auf der Trommel (14) zurückgehalten und in diese eine Nut (38) durch die Vakuumeinrichtung eingezogen wird.

23. Vorrichtung nach einem der Ansprüche 17 bis 22, die ferner enthält eine Schneideinrichtung (37) zum Schneiden des elastischen Materials (24) in einzelne elastische Streifen (44).

24. Vorrichtung nach einem der Ansprüche 17 bis 23, ferner enthaltend eine Antriebseinrichtung zum Drehen der Trommel (14) und einer Übertragungstrommel (34) unter der gleichen Winkelgeschwindigkeit, und wobei zwischen ihren Oberflächen ein Klemmspalt von dem etwa 0,25 bis etwa 3-fachen der Dicke des elastischen Materials (24) angeordnet ist, und wobei der Streifen (44) auf der Trommel (14) durch das Durchlaufen des Streifens (44) durch den Klemmspalt plaziert wird.

25. Vorrichtung nach Anspruch 24, ferner enthaltend eine Einrichtung (46,48) zum Anpressen der Enden des Streifens (44) gegen die Trommel (14), nachdem der Streifen (44) durch den Klemmspalt hindurchgetreten ist.

26. Vorrichtung nach Anspruch 25, wobei die Andrückeinrichtung eine erste Klemmspaltrolle (46) aufweist.

27. Vorrichtung nach Anspruch 26, wobei die Andrückeinrichtung eine zweite Klemmspaltrolle (48) aufweist.

28. Vorrichtung nach einem der Ansprüche 1 bis 27, wobei das Verhältnis zwischen 1,75:1 und 2:1 liegt.

Revendications

1. Procédé pour appliquer un matériau élastique (24) sur un support flexible (20), comprenant :

une alimentation du matériau de support flexible (20) sur un tambour (14) qui a des rainures de surface (38) parallèles à l'axe du tambour (14) de façon qu'au moins une partie dudit support flexible (20) recouvre le tambour (14) et la surface intérieure (50a, 50b, 52) d'au moins une des rainures (38) ;

une disposition d'au moins une bande non tendue (44) dudit matériau élastique (24) sur ledit tambour (14) où ledit matériau élastique (24) enjambe lesdites rainures (38) ;

un ancrage dudit matériau élastique (24) audit support flexible (20) à des zones d'ancrage (42a, 42b) entre lesdites rainures (38) au moyen de colle ;

un retrait dudit support flexible (20) dudit tambour (14) ;

une extension dudit support flexible (20) de façon que le matériau élastique (24) soit tendu pour recouvrir le support (20) ; et

une adhérence de la partie de matériau élastique (24) intermédiare desdites zones d'ancrage (42a, 42b) audit support (20) pendant que ladite partie intermédiaire est tendue ;

caractérisé par

la disposition de ladite bande élastique (44) en travers de la largeur d'une seule rainure (38) dans laquelle lesdites rainures (38) sont espacées l'une de l'autre par 5 à 25 cm environ sur ledit tambour (14) et chacune desdites rainures (38) a une surface intérieure sensiblement lisse (50a, 50b, 52) avec une longueur de surface de 3 à 24 cm environ, et dans laquelle chacune desdites rainures (38) est comprise entre 2,5 et 7,5 cm approximativement et le rapport entre la longueur de la surface et la largeur de la rainure est compris entre 1,3:1 et 3:1 environ ;

l'ancrage de ladite bande (44) par ses extrémités auxdites zones d'ancrage (42a, 42b) sur le bord d'une desdites rainures (38) de façon que ladite bande (44) enjambe seulement une rainure (38) ; et

l'application de ladite colle sur ledit support (20) de façon qu'il y ait plus de colle appliquée par unité de surface de support (20) pour coller les extrémités de ladite bande élastique (44) que pour coller ladite partie intermédiaire de ladite bande élastique (44).

2. Procédé selon la revendication 1 pour lequel ladite bande élastique (44) est ancrée à ses extrémités avec une colle piézo-sensitive.

3. Procédé selon la revendication 1 ou 2 pour lequel ladite bande élastique (44) est collée par ses extrémités en pulvérisant ledit support flexible (20) avec ladite colle, et en disposant ladite bande élastique (44) sur ledit support (20) et en appliquant une pression sur ladite bande élastique (44).

4. Procédé selon l'une quelconque des revendications 1 à 3, pour lequel ladite colle est appliquée en pulvérisant ladite colle sur ledit support flexible (20) pendant la rotation dudit tambour (14).

5. Procédé selon l'une quelconque des revendication 1 à 4, pour lequel ledit matériau élastique (24) a un module d'élasticité compris entre environ 80 N/m² et environ 120 N/m².

6. Procédé selon l'une quelconque des revendications 1 à 5, pour lequel ladite colle a une force de cisaillement entre 1.000 et 4.000 grammes environ.

7. Procédé selon l'une quelconque des revendications 1 à 6, pour lequel chacune desdites rainures (38) a une paire de côtés plats (50a, 50b) qui sont en pente vers le haut et vers l'extérieur depuis le fond de la rainure (38) et une partie en forme d'arc (52) qui relie lesdits côtés plats (50a, 50b) dans le fond de ladite rainure (38).

8. Procédé selon la revendication 7, pour lequel chacun desdits côtés plats (50a, 50b) est en pente avec un angle compris entre 5 et 20 degrés dans ladite rainure (38).

9. Procédé selon l'une quelconque des revendications 1 à 8, dans lequel ledit tambour (14) comprend un moyen pour établir le vide, et ledit procédé comprend en outre l'aspiration pour faire le vide sur ledit tambour (14), ce par quoi ledit support flexible (20) est retenu sur ledit tambour (14) et aspiré dans l'une desdites rainures (38).

10. Procédé selon la revendication 9, pour lequel le vide est établi entre environ 1.333 et 6.666 mbar (1.000 et 5.000 torr).

11. Procédé selon l'une quelconque des revendications 1 à 10, pour lequel ledit matériau élastique (24) est alimenté à partir d'un rouleau distributeur (18) vers un moyen de coupure (37) où il est coupé en bandes discrètes (44).

12. Procédé selon la revendication 11 pour lequel ledit tambour (14) et un tambour de transfert (34) tournent avec la même vitesse angulaire avec un jeu entre leurs surfaces compris entre environ 0,25 et 3 fois l'épaisseur dudit matériau élastique (24) et pour lequel ladite bande (44) est disposée sur ledit tambour (14) en passant ladite bande (14) à travers ledit jeu.

13. Procédé selon la revendication 12 pour lequel ladite bande (44) est ancrée à ses extrémités en appliquant une colle piézo-sensitive sur ledit support (20) avant que ladite bande (44) ne soit disposée sur ledit tambour (14).

14. Procédé selon la revendication 12 ou 13 comprenant en outre une compression des extrémités de ladite bande (44) contre ledit tambour (14) après que ladite bande (44) soit passée à travers ledit jeu.

15. Procédé selon l'une quelconque des revendications 1 à 14, pour lequel lesdites extrémités sont comprimées, en passant ladite bande (44) et le support (20), entre un rouleau de contact (46) et ledit tambour (14).

16. Procédé selon la revendication 15, pour lequel ladite bande (24) et le support (20) sont passés entre un second rouleau de contact (48) et ledit tambour (14) avant que ledit support (20) soit retiré dudit tambour (14).

17. Appareil (10) pour l'application d'un matériau élastique (24) sur un support flexible (20) comprenant :

des moyens (26a, 26b ; 28a, 28b) pour alimenter le matériau de support flexible (20) sur un premier tambour (14) de façon qu'au moins une partie dudit support flexible (20) recouvre le tambour (14) ;

ledit premier tambour (14) ayant des rainures de surface (38) parallèles à l'axe dudit premier tambour (14) ;

un moyen (34) pour disposer au moins une bande non tendue (44) dudit matériau élastique (24) sur ledit tambour (14), ce par quoi ledit matériau élastique (24) enjambe lesdites rainures (38) ;

un moyen (40, 34) d'ancrage dudit matériau élastique (24) audit support flexible (20) en des zones d'ancrage (42a, 42b) entre lesdites rainures (38) au moyen de colle ;

un moyen (16) pour retirer ledit support flexible (20) dudit tambour (14) ;

un moyen (16) pour tendre ledit support flexible (20) de façon que le matériau élastique (24) soit tendu pour recouvrir le support (20) ; et

des moyens (54, 56) d'adhérence de la partie élastique intermédiaire desdites zones d'ancrage (42a, 42b) audit support (20) pendant que ladite partie intermédiaire est tendue,

caractérisé par

un pistolet à colle (40) pour l'application de ladite colle audit support (20) de façon qu'il y ait plus de colle appliquée par unité de surface sur lesdites zones d'ancrage (42a, 42b) que sur le support (20) en garnissant lesdites rainure (38), et un moyen (34) pour disposer ladite bande élastique (44) à travers la largeur d'une seule rainure (38) et pour ancrer ladite bande (44) par ses extrémités en ces zones d'ancrage (42a, 42b) sur le bord de l'une desdites rainures (38) de façon que ladite bande (44) enjambe seulement une rainure (38), dans lequel lesdites rainures (38) sont espacées l'une de l'autre entre environ 5 et 25 cm sur ledit tambour (14), chacune desdites rainures (38) ayant une surface intérieure sensiblement lisse avec une longueur de surface comprise entre environ 3 et 24 cm, et dans lequel chacune desdites rainures (38) a une largeur comprise entre 2,5 et 7,5 cm approximativement, et le rapport entre la longueur de surface et la largeur de la rainure est compris entre environ 1,3:1 et 3:1.

18. Appareil selon la revendication 17 dans lequel lesdits moyens d'ancrage et d'adhérence comprennent un pistolet de pulvérisation de colle (40) et un moyen (46, 48) pour appliquer une pression sur ladite bande élastique (44).

19. Appareil selon la revendication 18, dans lequel ledit pistolet de pulvérisation de colle (40) est fixe et dans lequel la colle est appliquée en pulvérisant la colle sur le support flexible (20) pendant que ledit tambour (14) tourne.

20. Appareil selon l'une quelconque des revendications 17 à 19, dans lequel lesdites rainures (38) ont une paire de côtés plats (50a, 50b) qui sont en pente vers le haut et vers l'extérieur depuis le fond de la rainure, et une partie en arc (52) qui relie lesdits côtés plats (50a, 50b) au fond de ladite rainure (38).

21. Appareil selon la revendication 20, dans lequel chacun desdits côtés plats (50a, 50b) est en pente avec un angle compris entre 5 et 20 degrés dans ladite rainure (38).

22. Appareil selon l'une quelconque des revendications 17 à 21, dans lequel ledit premier tambour (14) comprend un moyen pour établir le vide, ce par quoi ledit support flexible (20) est retenu sur ledit tambour (14) et tiré dans une desdites rainures (38) par ledit moyen pour établir le vide.

23. Appareil selon l'une quelconque des revendications 17 à 22 qui comprend en outre un moyen de coupure (37) pour couper ledit matériau élastique (24) en bandes élastiques discrètes (44).

24. Appareil selon l'une quelconque des revendications 17 à 23, comprenant en outre un moyen d'entraînement en rotation dudit tambour (14) et un tambour de transfert (34) ayant la même vitesse angulaire et pour lequel il y a un jeu entre leurs surfaces compris entre environ 0,25 à 3 fois environ l'épaisseur dudit matériau élastique (24) et pour lequel ladite bande (44) est disposée sur ledit tambour (14) en passant ladite bande (44) à travers ledit jeu.

25. Appareil selon la revendication 24, comprenant en outre des moyens (46, 48) de compression des extrémités de ladite bande (44) contre ledit tambour (14) après que ladite bande (44) soit passée à travers ledit jeu.

26. Appareil selon la revendication 25 dans lequel ledit moyen de compression comprend un premier rouleau de contact (46).

27. Appareil selon la revendication 26 dans lequel ledit moyen de compression comprend un second rouleau de contact (48).

28. Appareil selon l'une quelconque des revendications 1 à 27, dans lequel ledit rapport est compris entre 1, 75:1 et 2:1.

FIG. 1

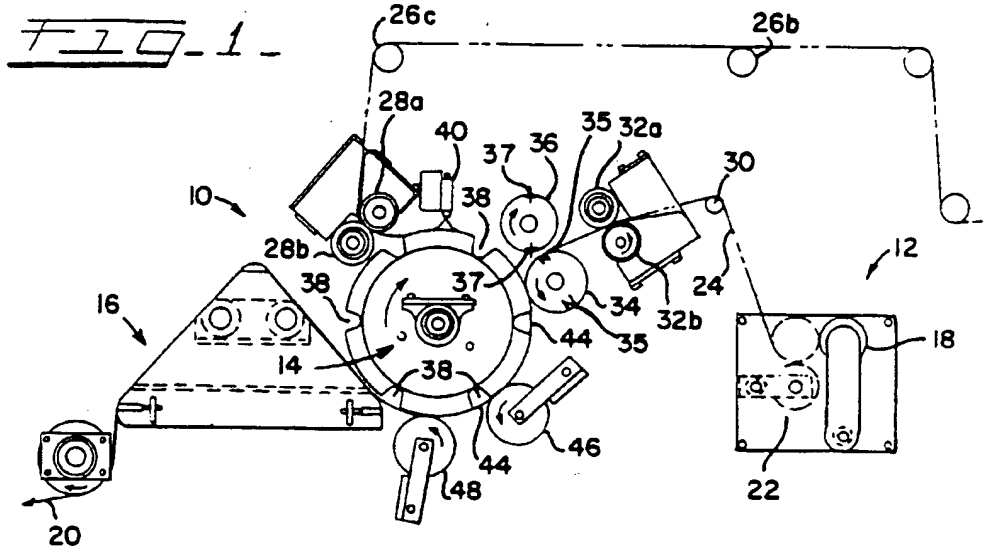

FIG. 2

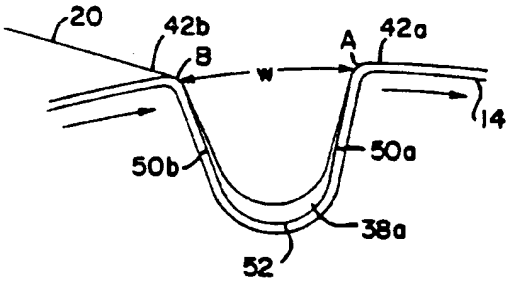

FIG. 3

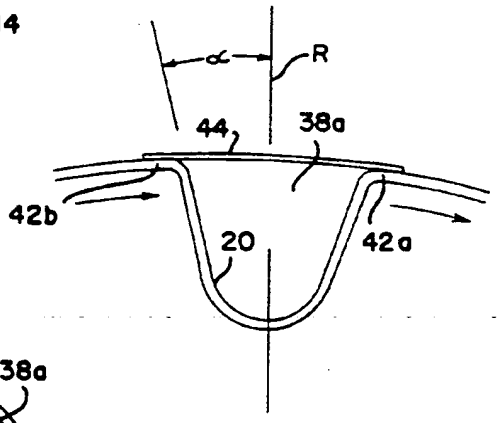

FIG. 4

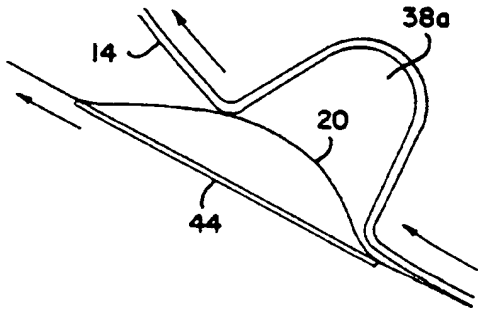

Fig. 5

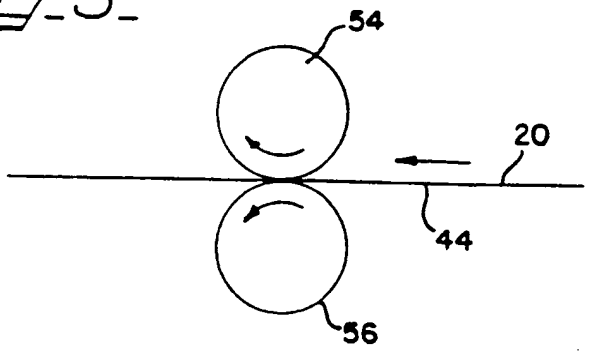

Fig. 6

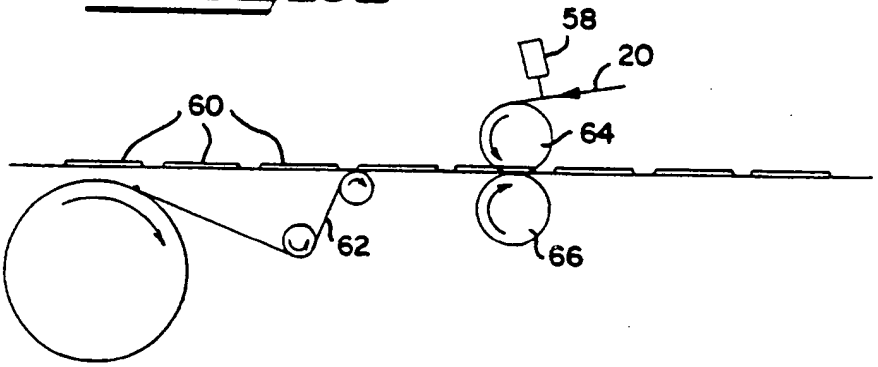

Fig. 7